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EXAMINER	
ANGEBRANNDT, MARTIN J	

ART UNIT	PAPER NUMBER
1756	

DATE MAILED: 08/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/724,271	JENSEN ET AL.	
	Examiner	Art Unit	
	Martin J. Angebranndt	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *5/14/04,7/9/04,10/15/04*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) *15-25 and 31* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14 and 26-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-31* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/15/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-14, drawn to optical recording media including proteorhodopsin, classified in class 430, subclass 270.15.

II. Claims 15-16, drawn to a liquid ink containing a proteorhodopsin, classified in class 252, subclass 589.

III. Claims 17-25, drawn to methods of forming solid suspensions of proteorhodopsins, classified in class 427, subclass 162.

IV. Claims 26-30, drawn to recording in an opticalreocrding mediumcontaining proteorhodopsin, classified in class 430, subclass 269.

V. Claim 31, drawn to printing with an ink containing proteorhodopsin, classified in class 347, subclass 1+.

2. The inventions are distinct, each from the other because of the following reasons:

Inventions group I and group II are directed to related inventions. The related inventions are distinct if the inventions as claimed do not overlap in scope, i.e., are mutually exclusive; the inventions as claimed are not obvious variants; and the inventions as claimed are either not capable of use together or can have a materially different design, mode of operation, function, or effect. See MPEP § 806.05(j). In the instant case, the first is a solid composition where data is recorded on the basis of imagewise exposure with light and the ink image is formed using patternwise application of the ink

Inventions group I and group III are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as

claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the polymer matrix can be formed and the proteorhodopsin imbibed into it.

Inventions group I and group IV are related and have been determined to present no significant search burden and so would be examined together.

Inventions group I and group V are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different designs, modes of operation, and effects (MPEP § 802.01 and § 806.06). In the instant case, the different inventions are not capable of use together and have different mode of operation.

Inventions group II and group III are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different designs, modes of operation, and effects (MPEP § 802.01 and § 806.06). In the instant case, the different inventions are not disclosed as capable of use together and they have different modes of operation, and effects as one is an ink and the other an optical recording medium.

Inventions group II and group IV are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different designs, modes of operation, and effects (MPEP § 802.01 and § 806.06). In the instant case, the different inventions are not disclosed as capable of use together and they have different modes of operation, and effects as one is an ink and the other is a process of recording in an optical recording medium

Inventions group II and group V are related as product and process of use. The inventions can be shown to be distinct if either or both of the following can be shown: (1) the process for using the product as claimed can be practiced with another materially different

product or (2) the product as claimed can be used in a materially different process of using that product. See MPEP § 806.05(h). In the instant case the ink may be applied onto a materials to provide a decorative pattern.

Inventions group III and group IV are directed to related inventions. The related inventions are distinct if the inventions as claimed do not overlap in scope, i.e., are mutually exclusive; the inventions as claimed are not obvious variants; and the inventions as claimed are either not capable of use together or can have a materially different design, mode of operation, function, or effect. See MPEP § 806.05(j). In the instant case, the inventions do not overlap in scope and have a materially different design, mode of operation, function, or effect as one is a process of forming and the other is an optical recording medium.

Inventions III and V are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different designs, modes of operation, and effects (MPEP § 802.01 and § 806.06). In the instant case, the different inventions are not disclosed as capable of use together and they have different modes of operation, and effects as one is a process of applying an ink and the other is an optical recording medium.

Inventions IV and V are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different designs, modes of operation, and effects (MPEP § 802.01 and § 806.06). In the instant case, the different inventions are not disclosed as capable of use together and they have different modes of operation, and effects as one is a process of applying an ink and the other is an process of recording in an optical recording medium.

3. Because these inventions are independent or distinct for the reasons given above and have acquired a separate status in the art in view of their different classification and because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

4. During a telephone conversation with Viola Kung (41,131) on July 20, 2006 a provisional election was made with traverse to prosecute the invention of group I, claims 1-14 (with claims 26-30 of group IV being examined with these as discussed above). Affirmation of this election must be made by applicant in replying to this Office action. Claims 15-25 and 31 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this

> subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1-4,8,9-14,26,28 and 29 are rejected under 35 U.S.C. 102(a) as being clearly anticipated by Dioumaev et al. "Proton Transfers in the photochemical reaction cycles of proteorhodopsin" Biochem., Vol. 41(17) pp. 5348-5358 (4/2002).

The photokinetics of the wild-type and the mutants D97E, D97 N and E108Q were observed with these encased in polyacrylamide gels. (page 5350 left column). The E108 has a larger M state intermediate concentration and is disclosed as a mutant having A similar phenotype to that of D96N of bacteriorhodposin (BR) (page 5352, left column, last paragraph).

The rejection of claims to the methods holds that any exposure meets the claims including a flood exposure of the entire medium as there is no language concerning the size or proportion of the medium bearing the information.

9. Claims 1-4,8,9-14,26,28 and 29 are rejected under 35 U.S.C. 102(a) as being clearly anticipated by Friedrich et al. "Proteorhodopsin is a light driven proton pump with variable vectorality" J. Mol. Biol. Vol. 321(5) pp. 821-838 (8/2002).

The measurement of absorption spectra with the proteorhodopsin embedded in 1 mm thick acrylamide gels. (page 835/left column). Teaching of the functional equivalence of proteorhodopsin and bacteriorhodposin (BR) is from the published data (ref 3) presented (page 822/right column). The M state is shown to be present when the pH is 10 as evidenced by figure

5 and the pH 7 includes both M and O species. (page 824) The M state corresponds the to the 410 nm absorption, the K state the 560 nm absorption and the O state the 580 nm absorption. The intial state absorbs at 530 nm (page 824). The application of a blue light after illumination with yellow light is disclosed. (page 829/right column with respect to figures 8b and c).

The rejection of claims to the methods holds that any exposure meets the claims including a flood exposure of the entire medium as there is no language concerning the size or proportion of the medium bearing the information.

10. Claims 1-14 and 26-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over **either** Dioumaev et al. "Proton Transfers in the photochemical reaction cycles of proteorhodopsin" Biochem., Vol. 41(17) pp. 5348-5358 (4/2002) **or** Friedrich et al. "Proteorhodopsin is a light driven proton pump with variable vectorality" J. Mol. Biol. Vol. 321(5) pp. 821-838 (8/2002), in view of Hampp et al. '279.

Hampp et al. '279 teaches that the bacteriorhodopin longest lived intermediate state is the M state which absorbs at 410 nm. (2/24-42). Useful matrix materials include polyacrylamide, gelatin, agarose, agar, polyvinlypyrrolidone, polyvinyl alcohol, polyvinyl acetate, polyhydroxymethacrylate and polyacrylate (5/34-43). The use of a first wavelength to write information, a second to readout the information and a third to erase the information is taught (6/10-60) see also examples with writing and readout.

It would have been obvious to one skilled in the art to modify the examples of **either** Dioumaev et al. "Proton Transfers in the photochemical reaction cycles of proteorhodopsin" Biochem., Vol. 41(17) pp. 5348-5358 (4/2002) **or** Friedrich et al. "Proteorhodopsin is a light driven proton pump with variable vectorality" J. Mol. Biol. Vol. 321(5) pp. 821-838 (8/2002) by

using other matrix materials, such as gelatin, agarose, agar, polyvinlypyrrolidone, polyvinyl alcohol, polyvinyl acetate, polyhydroxymethacrylate or polyacrylate, in place of the polyacrylamide with a reasonable expectation of forming a useful optical recording medium or medium for spectroscopic studies of proteorhodopsin based upon the disclosure of equivalence by Hampp et al. '279 and/or it would have been obvious to modify the examples of **either** Dioumaev et al. "Proton Transfers in the photochemical reaction cycles of proteorhodopsin" Biochem., Vol. 41(17) pp. 5348-5358 (4/2002) **or** Friedrich et al. "Proteorhodopsin is a light driven proton pump with variable vectorality" J. Mol. Biol. Vol. 321(5) pp. 821-838 (8/2002) by using light to write information by changing the proteorhodopsin to its M state in certain areas and erasing that information with exposure to light of another wavelength as taught by Hampp et al. '279 based upon these compounds being Archaeal rhodopsins exhibiting photosensitivity and the same stable states.

11. Claims 1-14 and 26-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over **either** Dioumaev et al. "Proton Transfers in the photochemical reaction cycles of proteorhodopsin" Biochem., Vol. 41(17) pp. 5348-5358 (4/2002) **or** Friedrich et al. "Proteorhodopsin is a light driven proton pump with variable vectorality" J. Mol. Biol. Vol. 321(5) pp. 821-838 (8/2002), in view of Hampp et al. '279, further in view of Wu et al. "Bacteriorhodopsin encapsulated in transparent solgel glass: A new biomaterial", Chem. Mater. Vol. 5 pp. 115-120 (1993).

Wu et al. "Bacteriorhodopsin encapsulated in transparent solgel glass: A new biomaterial", Chem. Mater. Vol. 5 pp. 115-120 (1993) teaches the formation of a sol-gel silica

matrix which allows the photocycle of bacteriorhodopsin to be used including the M state (see figure 5) and the use of this in optical imaging (abstract and page 120).

In addition to the basis provided above, the examiner holds that it would have been obvious to modify the combination of **either** Dioumaev et al. "Proton Transfers in the photochemical reaction cycles of proteorhodopsin" Biochem., Vol. 41(17) pp. 5348-5358 (4/2002) **or** Friedrich et al. "Proteorhodopsin is a light driven proton pump with variable vectorality" J. Mol. Biol. Vol. 321(5) pp. 821-838 (8/2002) with Hampp et al. '279 by using other matrices known to preserve the properties of rhodopsins, such as the sol-gel glasses taught by Wu et al. "Bacteriorhodopsin encapsulated in transparent solgel glass: A new biomaterial", Chem. Mater. Vol. 5 pp. 115-120 (1993) with a reasonable expectation of forming a useful optical recording medium or medium for spectroscopic studies of proteorhodopsin.

12. Claims 1-14 and 26-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hampp et al. '279, in view of either Beja et al. 'Bacterial Rhodopsin: Evidence for a new type of phototropy in the sea', Science 289, pp. 1902-1906 (09/2000) or Krebs et al., "Detection of fast light activated H+ release and M intermediate formation from proteorhodopsin", BMC Physiology, Vol. 2 pp. 5-12 (8 pages) (04/2002).

Beja et al. 'Bacterial Rhodopsin: Evidence for a new type of phototropy in the sea', Science 289, pp. 1902-1906 (09/2000) characterizes a new Archaeal rhodopsin pigment, proteorhodopsin. Kinetic experiments with a flashlamp show the base pigment to have an absorption at 500 nm, the formation of M intermediates (absorption at 400 nm) and and O intermediate (absorption at 590 nm) is disclosed. (page 1904, right column and figure 5).

Krebs et al., "Detection of fast light activated H+ release and M intermediate formation from proteorhodopsin", BMC Physiology, Vol. 2 pp. 5-12 (8 pages) (04/2002) teaches that at pH 8 proetorhodopsin undergoes a photocycle similar to that of bacteriorhodopsin. (page 5-6, numbered 1 of 8 and 2 of 8). Figures 3-5 show the M state formation and this is further discussed on page 9 in the right column (numbered 5 of 8). The spectroscopic analysis is done in micelles. (page 11 (numbered 7 of 8)).

It would have been obvious to one skilled in the art to modify the examples of Hampp et al. '279 by using other Archaeal rhodopsin pigments, such as proteorhodopsin taught by either Beja et al. 'Bacterial Rhodopsin: Evidence for a new type of phototropy in the sea', Science 289, pp. 1902-1906 (09/2000) or Krebs et al., "Detection of fast light activated H+ release and M intermediate formation from proteorhodopsin", BMC Physiology, Vol. 2 pp. 5-12 (8 pages) (04/2002) with a reasonable expectation of forming a useful optical recording medium based upon these compounds being Archaeal rhodopsins exhibiting photosensitivity and the same stable states. Further, it would have been obvious to modify the resultant examples by using light to write information by changing the proteorhodopsin to its M state in certain areas and erasing that information with exposure to light of another wavelength as taught by Hampp et al.

13. Claims 1-14 and 26-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hampp et al. '279, in view of either Beja et al. 'Bacterial Rhodopsin: Evidence for a new type of phototropy in the sea', Science 289, pp. 1902-1906 (09/2000) or Krebs et al., "Detection of fast light activated H+ release and M intermediate formation from proteorhodopsin", BMC Physiology, Vol. 2 pp. 5-12 (8 pages) (04/2002), further in view of Wu et al. "Bacteriorhodopsin

encapsulated in transparent solgel glass: A new biomaterial", Chem. Mater. Vol. 5 pp. 115-120 (1993).

In addition to the basis provided above, the examiner holds that it would have been obvious to modify the combination of Hampp et al. '279 with either Beja et al. 'Bacterial Rhodopsin: Evidence for a new type of phototropy in the sea', Science 289, pp. 1902-1906 (09/2000) or Krebs et al., "Detection of fast light activated H+ release and M intermediate formation from proteorhodopsin", BMC Physiology, Vol. 2 pp. 5-12 (8 pages) (04/2002)by using other matrices known to preserve the properties of rhodopsins, such as the sol-gel glasses taught by Wu et al. "Bacteriorhodopsin encapsulated in transparent solgel glass: A new biomaterial", Chem. Mater. Vol. 5 pp. 115-120 (1993) with a reasonable expectation of forming a useful optical recording medium or medium for spectroscopic studies of proteorhodopsin.

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Weetall, "D96N mutant bacteriorhodopsin immobilized in sol-gel glass charachterization", Appl. Biochem. Biotechnol. Vol. 49(1-3) pp. 241-256 (1994) describes the sol gel immobilization of bacteriorhodopsin and the effects of various parameters.

Jensen et al. '605 is a related case.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J. Angebranndt whose telephone number is 571-272-1378. The examiner can normally be reached on Monday-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Martin J Angebranndt
Primary Examiner
Art Unit 1756

7/27/2006